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A Relation of the Return of a Great permanent Spot in the Planet Jupiter, observed by Signor Cassini, one of the Royal Parisian Academy of the Sciences.

TIS now above six years, that Signor *Cassini* published the Theory of two sorts of *Spots*, at certain times to be seen in the Disk of *Jupiter* *.

One sort are nothing but the Shadows of the four *Satellites*, which he had often very well observed, when these *Satellites*, moving through the lower part of their small circles that environ *Jupiter*, did pass between him and the Sun which illuminates him, making a kind of Solar Eclipse, like that which the Moon maketh, when she is between the Sun and the Earth. These *Spots*, as he observed from that time, have this peculiar, which distinguisheth them from all others, *that* they are precisely found in that place of *Jupiter*, where some *Satellit* is seen by the Sun; *that* they go from the Oriental limb to the Occidental of the Disk of *Jupiter* with a motion alwaies equal to that of the *Satellit*; *that* in respect to us they preceed the *Satellit* before the opposition of *Jupiter* to the Sun, and follow him after the opposition; *that* the further *Jupiter* is distant from the opposition, the greater is the apparent distance of the same *Satellit*; *that* at divers times of the Year this distance changeth in proportion of the annual Parallax of the *Satellit*, according as he is differently seen by the Sun and by the Earth; and *that* at one and the same time of the year, when divers *Satellites* happen to be between *Jupiter* and the Sun, the *Spots* correspondent to them are distant from them in proportion of the semi-diameters of the circles of the same *Satellites*.

The other sort of *Spots* have no dependance at all from the *Satellites*; but it seems, that they have some resemblance to those *Spots* that sometimes appear in the Sun, or to those that are alwaies seen in the Moon; and they are perhaps of the same nature with those, that are called *Belts*. These *Spots* do also move from the Eastern to the Western limb of *Jupiter's* disk; but their apparent motion is unequal, and swifter near the Center than the Circumference; and they never are so well seen as when they approach to the Center, they being very narrow and almost imperceptible, when they approach to the Circum-

* What was discovered of the permanent Spot in this Planet here in England by M. Hook An. 1664. in May, may be seen N^o. 1. p. 3. compared with N^o. 4. p. 75. N^o. 8. p. 143. N^o. 12. p. 209. N^o. 15. p. 246.

ference : which makes us believe, that they are flat, and superficial to *Jupiter*.

Among these Spots of the second sort there is none so sensible, as one that is situate between the two Belts, which in the disque of *Jupiter* are ordinarily seen extended from east to west; the largest of which is between the Center and the Northern limb, and the narrowest is beyond the Center toward the Southern limb. This Spot is alwaies adhering to the *Southern Belt*; its diameter is about the tenth part of that of *Jupiter*; and at the time that its center is nearest to that of *Jupiter*, it is distant from it about the third part of the semi-diameter of that Planet.

Signor *Cassini*, after he had made many Observations of this Spot during the Summer of the year 1665, found, that the period of its apparent revolution is of *nine hours and fifty six minutes*; and having taken an *Epocha* of the time, when it arrived at the middle of the Belt, he calculated *Tables* and *Ephemerids* of its motion for the end of the said year 1665, and for the beginning of 1666. He continued to observe it until the beginning of 1666, when *Jupiter* approached to the beams of the Sun; and the Observations were found conform enough to his *Ephemerids*. But after it was got free of the sun-beams, this Spot was difficult to be discerned: And as this gave ground to believe, that it might be of the nature of the Spots of the Sun, which, after having appeared for a while, disappear for ever, Signor *Cassini* ceased at length to observe them.

But *Jan. 19.* of this present year 1672. (A. N.) when he observed *Jupiter* at $4\frac{1}{4}$ a clock in the morning, he perceived in the same place of his disque the Figure of the same Spot, adhering to the same *Southern Belt*. It was already gone beyond the moiety of this Belt, and he saw it advance little by little towards the Western limb, to which it seemed to be very near at $6\frac{1}{4}$ a clock: But it then appeared so small and little, and so little sensible, that he was obliged to cease from observing it.

By the Celerity of its motion near the Center, and by the place where he had begun to see it, he judged, that it might have been in the midst of the *Belt* at 4 a clock and 35 min. in the morning: And as he prepared himself to make *Ephemerides* of its motion for this present year 1672, he perceived, that in those, he had made for the year 1666, by good luck, this Spot had been in the midst of *Jupiter* the same day, namely the

the 19th of *January* at the same hour in the morning, the reduction of hours being made by the difference of the *Meridians*. So that by the calcul he made, in six years, of which one is a *Bis sextile*, it is found to have made, in respect of the Earth, at least 5294 revolutions, each of 9 hours 55 minutes, 58 seconds, compensating one revolution by another; and at most 5295 revolutions of 9 hours, 55 minutes, 51 seconds; forasmuch as he was assured of the preciseness of one *Mean Revolution* to one eighth of a minute: which will be verified by future observations. Thus the *Ephemerides* were found ready made for the first months of this present year, but only that we are a little differently to apply the Equations, that amount to some minutes, because that the distance, which *Jupiter* now is at from the Sun and from his Apogee, is different from that, which he was at in the beginning of the year 1666; and that in this present year after the month of *February*, that day is to be counted which hath been added for the *Bis-sextile*. The Observations, which Signor *Cassini* hath continued to make since the 19th of *January*, as far as the weather did permit, have alwaies been found conform to those *Ephemerides*.

Until then he had never yet seen an *immediate* return of this Spot after 9 hours and 56 minutes, because it had not hapned, that *Jupiter* after the apparition of the Spot had stay'd, in one and the same night, long enough above the Horizon, at least at a sufficient height to observe him with due distinctness. He had only concluded the time of this revolution by returns observed after about 20, 30, and 50 hours; and he had more precisely limited it by observations more distant. But the night after the 1 day of *March*, at 7 $\frac{1}{2}$ a clock in the evening, he saw this Spot in the midst of the Belt; and the same night, at 5 a clock and 26 minutes in the morning, he saw it again returned precisely to the same place. Next day he made a report of these Observations to the *R. Academy of the Sciences*, and predicted, that the Spot would arrive again at the midst of the Belt *March 3^d* at 9 a clock and 8 minutes at night, whereupon that Assembly deputed M. *Buot* and M. *Mariotte* to be present at the Observation; who being come to the *R. Observatory* began to see at 8 a clock and 4 minutes the Spot already somewhat removed from the Oriental limb, but yet obscure and small. At 8 a clock and 47 minutes they saw it very distinctly advancing

towards the middle of the Belt. From 9 a clock 5 minutes and 40 seconds, untill 9 a clock and 8 minutes, they saw it in the midst of the Belt. At 9 a clock and 15 minutes it was passed the middle, and was come nearer to the Occidental limb. And a little after the Heavens being over cast, he could then observe it no further.

This Observation being taken for the *Epocha*, it is easie to find hereafter the times, when this Spot shall return to the midst of the Belt. For you are only to add alwaies 9 hours and 56 minutes, and, for greater precisenes's sake, not to omit the ordinary Equation of days, that depends from the inequality of the motion of the Sun in respect of the Equinoctial, nor the particular Equation, that depends from the inequality of the motion of *Jupiter* according to the diversity of the distance of the Sun and his Apogee.

This Revolution being the swiftest and the most regular that is hitherto known in the Heavens, a Travellour alone, even without having any correspondence with other Observers, may make use of it to find the *Longitudes* of the most remote places of the Earth. We shall hereafter examine, to what preciseness we may arrive by this way.

Observations of a New Comet, made at Paris in the Royal Observatory by Signor Cassini.

Here now appears a Comet, which seems to be near the end of his Appearance, and which might have been seen above a month since, if the weather had been favourable. But he being very small, and having been a long while observed by the beams of the Sun, to which he was nigh, and afterwards by the Moon, which was greatly advanced in her light, besides that the Heavens in these parts have often been over-cast, we have not observed him but lately.

The Mathematicians of *la Fleche* perceived him from the 16 of March, and gave us here at *Paris* the first notice of it. Those of the College of *Clermont* being advertised of it, saw him the 25th of the same month. And upon notice given of it to the *R. Academy of the Sciences* by *P. Pardies*, Professor of the Mathematicks in the College of *Clermont*, Signor *Cassini* hath ever since been observing him as much as the weather did permit